Citation:

Tousman S, Arnold D, Helland W, Roth R, Heshelman N, Castaneda O, Fischer E, O'Neil K, Bileto S. Evaluation of a hand washing program for second-graders. *J Sch Nurs.* 2007 Dec; 23 (6): 342-348.

PubMed ID: 18052520

Study Design:

Non-randomized trial with concurrent controls

Class:

C - Click here for explanation of classification scheme.

Research Design and Implementation Rating:

NEUTRAL: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

To determine if a learner-centered hand washing intervention program can increase hand hygiene behaviors of second grade students, and to evaluate the effectiveness of the program (via absentee rate).

Inclusion Criteria:

First or second grade students in nineteen first or second grade classrooms in seven schools in the Rockford, Illinois Public School System.

Exclusion Criteria:

Not first or second grade students, and not enrolled in one of nineteen first or second grade classrooms in seven schools in the Rockford, Illinois Public School System.

Description of Study Protocol:

Recruitment

Members of the Rockford Hand Washing Coalition [composed of volunteers from Rockford College (faculty and students), the Winnebago County Health Department (staff) and members of the community] established a working relationship with the 19 second-grade teachers who agreed to let coalition staff members come into their classrooms for four consecutive weeks.

Design

- Prospective cohort study
- Students were non-randomized into control or intervention groups; outcome measures were

assessed.

Intervention

- Volunteers of a local hand washing coalition visited schools weekly for four weeks to conduct hygiene education as follows:
    - Open-ended class discussion: Staff members would start with a series of open-ended questions (e.g., Why do we get sick? Can we see germs?) designed to promote class discussion, storytelling and problem solving. After listening to students, staff integrated curriculum into the discussion
    - Learning demonstration and activity:
        - Week 1: Students looked at germs on hands using GlitterBug® device (UV light/glow product) before and after learning correct hand-washing techniques
        - Week 2: Each student touched an agar plate before and after hand washing
        - Week 3: Each student discussed their agar plate results with a staff member
        - Week 4: Same as week one, but with no hand-washing instruction
    - Distribution of handouts:
        - Each student received hand hygiene coloring sheets and stickers to take home
        - On final week, students received a completion certificate
    - Summary of Key Learning Points/Self-monitoring:
        - At the end of each session, staff asked class members to summarize key points of the presentation
        - Staff instructed students to self-monitor their health and hygiene behavior during the week to discuss at the next session
- Parents and teachers completed evaluation surveys.

Statistical Analysis

All data were analyzed using SAS.

- *Parent Evaluation Survey:*
    - Six-item survey asking parents to evaluate their child's hand hygiene behavior at home
    - Completed between weeks three and four
    - Descriptive statistics computed for responses
- *Teacher Evaluation Survey:*
    - Five-item survey asking teachers to evaluate the value and effectiveness of the program, and to make suggestions for improvement
    - Descriptive statistics computed for responses
- *Agar Plate Data:*
    - Staff assessed plates as having "fewer," "more," or an "equal" amount of germs before and after hand washing
    - A chi-square goodness-of-fit computation was done for these results
- *Absenteeism Data:*
    - Absenteeism data was collected for 19 second grade intervention classes and 19 first grade control classes (at the same schools). The school was unable to separate out absenteeism due to illness
    - Absenteeism rates were computed for each classroom (total days absent in each class vs. total number of possible days of attendance)
    - A one-factor repeated measures analysis of variance was computed on the absenteeism rates between intervention and control classes
    - Measurements were taken one week before the start of the intervention, and the four

weeks of the intervention.

Data Collection Summary:

Timing of Measurements

- Parent evaluation survey data was collected between weeks three and four
- No information was provided on when teacher evaluation survey was collected
- Agar plate data collected at week two class lesson
- Absenteeism data collected one week prior to start of intervention, and four weeks of intervention.

Dependent Variables

- Parent evaluation was via a six-item survey to assess child's hand hygiene behavior at home
- Teacher evaluation was via a five-item survey to assess the value and effectiveness of the program and to elicit suggestions for improvement
- Agar plate data: Staff assessed plates as having "fewer," "more," or an "equal" amount of germs before and after hand washing
- Absenteeism data: Collected by school (unable to separate out absenteeism due to illness).

Independent Variables

- Hand washing
- Hand hygiene instruction and support.

Description of Actual Data Sample:

- *Initial N:* 406
- *Attrition (final N):* 406 (no information provided regarding exclusion or withdrawals)
- *Age:* First and second graders
- *Location:* Rockford, Illinois.

Summary of Results:

Key Findings

- Agar Plate Results: 58% of the agar plates were cleaner after hand washing ($P<0.001$); determined via chi-square goodness of fit
- Absenteeism Rates:
    - Absenteeism rates were 34% lower during weeks three and four of the intervention
    - Intervention classes had a statistically significant decrease in absenteeism rates when compared to control classes ($P=0.027$); determined via a one-factor repeated measures of analysis of variance
- Overall: This hand washing education program among second graders reduced school absenteeism and was associated with lower microbial loads in hands, compared to the reference group formed by first graders in the same schools.

Other Findings

- Parent Evaluation Surveys: 47.5% of parents returned surveys (N=193)

- 64% noticed an increase in frequency of their child's hand washing behavior
- 50% noticed an increase in the duration of hand washing
- 79% did not have to remind their children to wash hands before a meal
- 70% said their child had approached them about controlling germs in the house

- Teacher Evaluation Surveys: 87% of second grade teachers returned surveys (N=16)
  - 87% found the program valuable
  - 94% noticed an increase in student hand washing during the program
  - 81% thought the volunteers used valuable techniques
  - 100% would recommend the program to other teachers.

Author Conclusion:

- A majority of parents and teachers noticed an increase in hand washing behavior
- Parents gave examples of children engaging in self-management behaviors (e.g., washing hands before a meal without prompting)
- Hand washing significantly decreased dirty hands (as determined via agar plates)
- Intervention classes showed decreased absenteeism.

Reviewer Comments:

- *The authors note the following limitations:*
  - *Inability to get data on absenteeism due to illness, may have confounded the results of this study*
  - *Only about 50% of parents returned the survey; perhaps parents who didn't return the survey did not notice any changes in their child's hand washing behavior*
  - *Only 58% of students had cleaner hands after washing (as determined via agar plates), so more skill building may be necessary*
- *Reviewer notes:*
  - *Unclear why this school district or these students were recruited or chosen*
  - *Unclear why the authors chose younger students (first grade) for the control group*
  - *Unclear if characteristics of intervention students vs. control students were similar at baseline (e.g., use of hand sanitizer in the home, general health)*
  - *The inability to get absenteeism data due to illness undermines the importance of the study. Dirty or clean hands only matter inasmuch as they can be linked to illness or health*
  - *The staff assessment of agar plates seems somewhat subjective.*

Research Design and Implementation Criteria Checklist: Primary Research

Relevance Questions		
1.	Would implementing the studied intervention or procedure (if found successful) result in improved outcomes for the patients/clients/population group? (Not Applicable for some epidemiological studies)	Yes
2.	Did the authors study an outcome (dependent variable) or topic that the patients/clients/population group would care about?	Yes

3.	Is the focus of the intervention or procedure (independent variable) or topic of study a common issue of concern to nutrition or dietetics practice?	Yes
4.	Is the intervention or procedure feasible? (NA for some epidemiological studies)	Yes

Validity Questions

1.	**Was the research question clearly stated?**	Yes
1.1.	Was (were) the specific intervention(s) or procedure(s) [independent variable(s)] identified?	Yes
1.2.	Was (were) the outcome(s) [dependent variable(s)] clearly indicated?	Yes
1.3.	Were the target population and setting specified?	Yes
2.	**Was the selection of study subjects/patients free from bias?**	???
2.1.	Were inclusion/exclusion criteria specified (e.g., risk, point in disease progression, diagnostic or prognosis criteria), and with sufficient detail and without omitting criteria critical to the study?	No
2.2.	Were criteria applied equally to all study groups?	Yes
2.3.	Were health, demographics, and other characteristics of subjects described?	No
2.4.	Were the subjects/patients a representative sample of the relevant population?	???
3.	**Were study groups comparable?**	???
3.1.	Was the method of assigning subjects/patients to groups described and unbiased? (Method of randomization identified if RCT)	???
3.2.	Were distribution of disease status, prognostic factors, and other factors (e.g., demographics) similar across study groups at baseline?	???
3.3.	Were concurrent controls used? (Concurrent preferred over historical controls.)	???
3.4.	If cohort study or cross-sectional study, were groups comparable on important confounding factors and/or were preexisting differences accounted for by using appropriate adjustments in statistical analysis?	???
3.5.	If case control or cross-sectional study, were potential confounding factors comparable for cases and controls? (If case series or trial with subjects serving as own control, this criterion is not applicable. Criterion may not be applicable in some cross-sectional studies.)	N/A

3.6.	If diagnostic test, was there an independent blind comparison with an appropriate reference standard (e.g., "gold standard")?	N/A
4.	**Was method of handling withdrawals described?**	???
4.1.	Were follow-up methods described and the same for all groups?	???
4.2.	Was the number, characteristics of withdrawals (i.e., dropouts, lost to follow up, attrition rate) and/or response rate (cross-sectional studies) described for each group? (Follow up goal for a strong study is 80%.)	???
4.3.	Were all enrolled subjects/patients (in the original sample) accounted for?	???
4.4.	Were reasons for withdrawals similar across groups?	???
4.5.	If diagnostic test, was decision to perform reference test not dependent on results of test under study?	N/A
5.	**Was blinding used to prevent introduction of bias?**	???
5.1.	In intervention study, were subjects, clinicians/practitioners, and investigators blinded to treatment group, as appropriate?	???
5.2.	Were data collectors blinded for outcomes assessment? (If outcome is measured using an objective test, such as a lab value, this criterion is assumed to be met.)	???
5.3.	In cohort study or cross-sectional study, were measurements of outcomes and risk factors blinded?	???
5.4.	In case control study, was case definition explicit and case ascertainment not influenced by exposure status?	N/A
5.5.	In diagnostic study, were test results blinded to patient history and other test results?	N/A
6.	**Were intervention/therapeutic regimens/exposure factor or procedure and any comparison(s) described in detail? Were interveningfactors described?**	Yes
6.1.	In RCT or other intervention trial, were protocols described for all regimens studied?	Yes
6.2.	In observational study, were interventions, study settings, and clinicians/provider described?	Yes
6.3.	Was the intensity and duration of the intervention or exposure factor sufficient to produce a meaningful effect?	Yes
6.4.	Was the amount of exposure and, if relevant, subject/patient compliance measured?	Yes
6.5.	Were co-interventions (e.g., ancillary treatments, other therapies) described?	No
6.6.	Were extra or unplanned treatments described?	No

6.7.	Was the information for 6.4, 6.5, and 6.6 assessed the same way for all groups?	Yes
6.8.	In diagnostic study, were details of test administration and replication sufficient?	N/A
7.	**Were outcomes clearly defined and the measurements valid and reliable?**	No
7.1.	Were primary and secondary endpoints described and relevant to the question?	Yes
7.2.	Were nutrition measures appropriate to question and outcomes of concern?	Yes
7.3.	Was the period of follow-up long enough for important outcome(s) to occur?	Yes
7.4.	Were the observations and measurements based on standard, valid, and reliable data collection instruments/tests/procedures?	No
7.5.	Was the measurement of effect at an appropriate level of precision?	No
7.6.	Were other factors accounted for (measured) that could affect outcomes?	No
7.7.	Were the measurements conducted consistently across groups?	Yes
8.	**Was the statistical analysis appropriate for the study design and type of outcome indicators?**	Yes
8.1.	Were statistical analyses adequately described and the results reported appropriately?	Yes
8.2.	Were correct statistical tests used and assumptions of test not violated?	Yes
8.3.	Were statistics reported with levels of significance and/or confidence intervals?	Yes
8.4.	Was "intent to treat" analysis of outcomes done (and as appropriate, was there an analysis of outcomes for those maximally exposed or a dose-response analysis)?	N/A
8.5.	Were adequate adjustments made for effects of confounding factors that might have affected the outcomes (e.g., multivariate analyses)?	No
8.6.	Was clinical significance as well as statistical significance reported?	No
8.7.	If negative findings, was a power calculation reported to address type 2 error?	N/A
9.	**Are conclusions supported by results with biases and limitations taken into consideration?**	Yes
9.1.	Is there a discussion of findings?	Yes
9.2.	Are biases and study limitations identified and discussed?	Yes
10.	**Is bias due to study's funding or sponsorship unlikely?**	???

10.1.	Were sources of funding and investigators' affiliations described?	Yes
10.2.	Was the study free from apparent conflict of interest?	???